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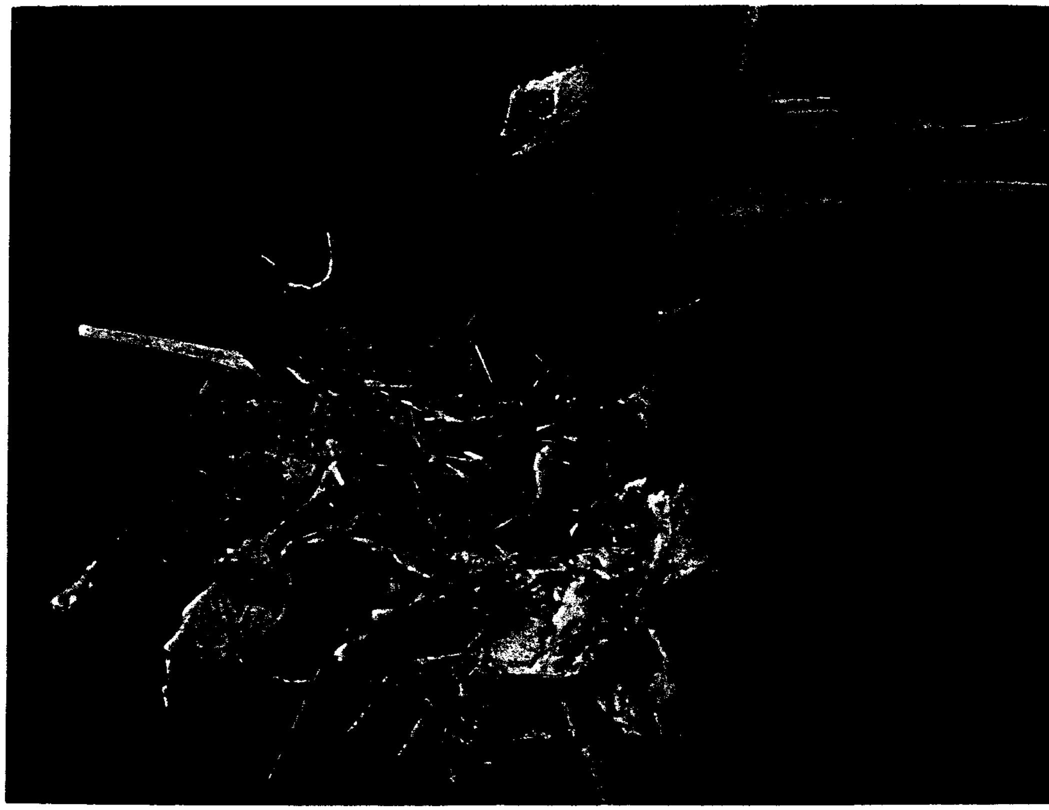
Brown-headed Cowbird: agent of extermination?

by Harold Mayfield



Hooded Warbler feeding a young cowbird. Photo by Alvin E. Staffan.

WHEN A BEGINNING birdwatcher finds a cowbird egg or large voracious young in the nest of a small songbird, he invariably reacts with indignation, if not violence. But the more sophisticated naturalist reassures him, pointing out that there should be no cause for alarm, that nature's ways are sometimes inscrutable but these birds would not be here if they couldn't live together.

The prevailing mood among naturalists is that wild creatures are usually secure among themselves. The obvious dangers are often inconsequential, and apparent enemies may actually be friends in disguise. This sense of dynamic equilibrium is embodied in the familiar phrase "balance of nature." Also serious students of biology have acquired a deep distrust of sentimentality, and the prevailing view may have an element of backlash against maudlin superficiality.

The customary reassurances have much truth in them. But they are not the whole truth. Relationships in nature are often complex — sometimes so complex we do not claim to understand them fully — but everything is not going well with every living creature. In nature there are losers as well as winners. At any moment we are likely to be looking at a select group of survivors. What about those that fell by the wayside?

Extinction also is a reality of nature. Naturalists are acutely aware of the intrusion of man, and these are often so gross as to make us forgetful of changing stress buried deeper in the fabric of nature. Change is inevitable. Some changes are abrupt and dramatic. Those wrought by man are almost instantaneous in nature's scale of time, but so are those caused

natural cataclysms — volcanoes, forest fires, tidal waves, and hurricanes. Others proceed with almost imperceptible slowness — climatic shifts, the advance and retreat of glaciers, rising and falling of ocean levels, movements of the earth's crust, and adaptations (evolution) in plants and animals. All of these shifts, fast or slow, upset old equilibriums and bring new deals with new winners and new losers. One paleontologist says no animal species has lived completely through a geological period. Every species has evolved into another or it has died.

The schoolchild knows about dinosaurs. He knows they flourished in a different climate from that of today. Presumably they could not cope with the cooling of their environment, but the exact mechanisms that forced them out are not known. Perhaps their greatest problem was food supply, but also perhaps they were too slow in adapting to match the up-and-coming class of mammals. Man had nothing to do with it. He wasn't here.

ISLANDS THAT GET cut off from the mainland invariably lose species of birds, even without significant changes in climate or vegetation. Yet most of the declines we have witnessed with our own eyes have come about directly from the hand of man. Market hunting exterminated the Passenger Pigeon and almost finished the bison. The gun has eliminated large mammals from the vicinity of most populated areas. More often, however, the damage by man has been indirect, and other agents have been involved. When rats, dogs, cats, and pigs have been introduced on remote islands, the effect has often been disastrous. The taking over of the northern Great Plains for agriculture has pushed the Whooping Crane from the heart of its nesting range to the extreme periphery. The preemption of the deepest soils on Bermuda for men's purposes expelled the Cahow to the stony terrain of islets where it could not compete for burrows with the White-tailed Tropicbird.

Probably the most sweeping change in bird life in recent history occurred in New Zealand, where species were eliminated wholesale when man introduced the first land mammals there. Even such gentle creatures as deer and rabbits had a disastrous effect on some native birds.

These examples are remote from most of us, but we may have an example close to home in the Brown-headed Cowbird. It, too, is the beneficiary of changes brought by man. It, too, has the potential for extirpation of small songbirds it has reached through recent expansion of its range in United States and Canada. The case is best documented for the Kirtland's Warbler, but similar damage may be occurring in other species, at least in local populations.

How the cowbird operates

THE COWBIRD IS unique among "predatory" agents in America. It is a social parasite, building no nest of its own but using the nests of other birds, usually smaller species, for the deposit of eggs, their incubation, and the care of its young. Many hosts are unaware they have a stranger in their midst, and they rear the cowbird as their own until it achieves independence and joins its own kind.

The host suffers at every stage of this process. First, the cowbird removes about as many eggs from nests as it lays, usually leaving the total clutch size unchanged. This tends to mask the entry of the new egg and to keep the host from abandoning the nest as it might do if it noticed an abrupt change in the contents. These acts normally take place during the host's several days of egg laying, when the nest is left unattended nearly all the time.

Next, the host suffers from reduced hatching success of its own eggs. Where the cowbird egg is larger, it gets more than its share of the heat from the breast of the host; and when the cowbird egg hatches first, as it usually does, the host tends to slack off incubating even though its own eggs are still unhatched.

And finally, the cowbird nestling, arriving first and being larger than the host nestlings when they appear, tramples them and gets more than its share of the food brought by adults. The cowbird hatches after about twelve days of incubation and thus gets one to four days' headstart over most nestmates. Hence, a young warbler weighing less than two grams often arrives in a nest already occupied by a cowbird weighing more than ten grams. In this unequal struggle, the warbler often does not last through the first day.

Damage done by the cowbird

THE HARM TO the nest invaded is undeniable, but the ultimate harm to the host species may be negligible. If only a few nests are bothered, the losses may be easily supportable by the reproductive capacity of the species. Some birds are much less injured than others. Large birds suffer less than small ones. Some birds have effective defenses. The classic defense is desertion of the nest; many, particularly the ground-nesting sparrows that have had long experience with the cowbird in the Midwest, usually abandon a nest when an egg is removed or added by any other agent. Then they renest in another location, repeating this again and again if necessary, until unmolested. The Yellow Warbler is famous for a variant of desertion; it sometimes builds a new floor over a clutch containing a foreign egg, and lays a new set in the same cup. The

Gray Catbird, whose deep-green egg contrasts sharply with the pale speckled egg of the cowbird, promptly throws out the offending object.

If a host species has no adequate defense of its own, the harm it suffers depends on the number of cowbirds present. The more cowbirds, the more nests that will be entered, and the more nests that will receive two or more eggs each. This last factor is particularly significant, because one cowbird nestling may do only moderate damage while two cowbird nestlings may be fatal to all other young in the nest. So the harm rises more sharply than does the density of the cowbirds.

With one host or with a group of receptive hosts in an area, the probability that a nest will get cowbird attention and the probability it will get one, two, three, or more cowbird eggs can be predicted from just two facts: the number of cowbird eggs laid and the number of nests available. The cowbird distributes its eggs with the impartiality of a roulette wheel.

In her classic study of the Song Sparrow in Ohio, Margaret Nice found, with less than half

Above: cowbird egg in Gray Catbird nest. Photo by Dave Norris. Below: juvenile cowbird. Photo by Leonard Lee Rue, III, both from Photo Researchers, Inc.

its nest parasitized, the sparrow suffered about 30 per-cent loss of production of young; but her alarm was allayed by the fact thather sample was not typical, being somewhat more heavily parasitized than others reported. The damage from each cowbird egg was higher in the eastern Phoebe studied by Erwin E. Klaas in Kansas. He found that one cowbird egg doomed the other occupants of the nest since it hatched ordinarily three or four days ahead of the phoebes. Yet the phoebe keeps its production up through the stratagem of raising two broods routinely, the second coming late enough to escape most of the cowbird interference. With about one-fourth of all phoebe nests entered, the total loss to the phoebes was nearly one-fourth of their potential yield.

On the other hand, in the Kirtland's Warbler I found the cowbirds exacted 40 per cent loss with 58 per cent of nests parasitized, and many years ago expressed concern about the warbler's ability to sustain this. A 40 per cent loss might not seem prohibitive since 75 per cent of young are destined to be lost in the first year of life anyway. But it becomes ominous when it comes from a single unremitting cause at the outset, and all the usual causes of death are superimposed upon it. It is hard to find other examples in nature where so large a toll is taken regularly by one agent.

The cowbird's insidious effect

BUT WORSE WAS to come. My analysis reflected conditions mainly in the 1940s and 1950s. Subsequently, the work of Lawrence Walkinshaw, Nicholas Cuthbert, and Bruce Radabaugh in the 1960s and 1970s showed parasitism rates climbing to about 70 per cent, with alarmingly high losses. In one disastrous year 83 per cent of nests were parasitized, and 29 nests in the study sample yielded only two warbler fledglings. No short-lived bird could endure many years like this one.

The cowbird's effect on a vulnerable host is particularly insidious because it is unrelenting even though the host may be vanishing. Many natural hazards ease up when the threatened creature becomes scarce. Competition within species for food, shelter, and space relaxes when the population declines. Similarly, the classic pattern of predation is density dependent; that is, predators concentrate on a certain prey when it is abundant and turn elsewhere when it becomes scarce. Every trout fisherman uses this fact when he selects his lure to match the kind of food the trout are seeking that day.

The cowbird is not deterred by the scarcity of one host. It may be dependent on the totality of its hosts, but it is not steered away from the rarest of them. The very last nest of a vanishing species is just as likely to be used as one among many.

In the early 1940s I helped in a Breeding Bird Census on the best of Kirtland's Warbler habitat. We censused the same tract thoroughly in three consecutive years. Here Kirtland's Warblers comprised just 10 per cent of potential cowbird hosts, and the number of female cowbirds approximately matched the numbers of pairs of warblers. These would be sufficient to provide eggs for all the available Kirtland's nests at least twelve times over, if cowbird females lay twelve eggs per season, a very conservative estimate. So obviously the cowbird is visiting many other kinds of nests.

If any cowbirds specialize on one host, as the European Cuckoo does, we have not discovered it. A female cowbird trying to lay all her eggs in Kirtland's Warbler nests would surely have an impossible task keeping a large enough area under surveillance to find enough nests at the right stage at the right time.

Recent spread of the cowbird

IF ALL OUR small songbirds had coexisted with the cowbird from time immemorial, we could probably rest our fears. But this is not true. The cowbird has vastly expanded its range and numbers in modern times, and in this process it has gained access to many hosts that are new.

Originally the cowbird was native to the grasslands of the midcontinent. There it followed the bison and other grazing animals, eating the insects stirred up in their wake. It preferred in nesting season not expanses of completely open plains, but regions where trees rose above the grasses and provided elevated perches. The human settler created exactly these conditions. He made openings in the forest and he planted trees in the plains. His livestock took the place of the bison, and the bird got its name from its habit of frequenting cowpens.

The cowbird seems to have been missing from eastern North America when the colonists arrived. It was not listed in the definitive tenth edition of Linnaeus' "Systema Naturae" in 1758, although the other common blackbirds, the Red-wing and Common Grackle, were included. Peter Kalm, who visited New York, Pennsylvania, and Ontario in 1747-50, gave a detailed account of mixed flocks of blackbirds in grain fields, but did not mention the cowbird.

Already much of the eastern seaboard had been under cultivation for a century, and even earlier there had been extensive clearings in the

Cowbird eggs in rebuilt Yellow Warbler nest. Photo by I. Jelkin.

eastern forest — variously called "meadows," "prairies," and "swales" — maintained by flooding or by fires set deliberately by the Indians. Some of this land was doubtless suitable to the cowbird, but a continuous path had not yet been opened for the bird from its heartland. This was probably provided first by the herdsmen who preceded the farmers in the tide of Europeans westward. In the occupation of America, the hunters, trappers, and traders came first and left their mark in trading posts. Next came the herdsmen who are almost forgotten by history because they left so few traces. Moving far ahead of the permanent settlers, they wandered the free range and produced the only crop that could walk itself to market from the far frontier.

The free range in Virginia in the late 1600s lay at the outskirts of the tidewater communities. Soon it was on the Piedmont, and by 1750 officers of Braddock's army noted the "cowpen men" beyond the Cumberland gap. Shortly thereafter, droves of swine, sheep, and cattle were moving through Kentucky. The southern Appalachians remained largely free cattle range throughout the 1700s. Herds beat wide paths through the tall grasses of the valley floors, and the herdsmen improved the grazing with fire and ax. Gateways through the forest were first opened in the southern Appalachians.

Mark Catesby met a "cowpen bird" between 1722 and 1725 in the Carolinas, but the fact that he pictured a female rather than the more striking male and the fact that no one else mentioned it for many years thereafter, suggests it was just beginning to cross the mountains. However, by 1790, it was common as far north as Pennsylvania and New York. Heavily forested states west of the mountains, Ohio and Michigan, did not get cowbirds until about 1850, and the bird did not reach the pinelands of northern Michigan until about 1880, after the regions to the south had been cleared and the northwoods had been opened by the lumberman and the marginal farmer who supplied him with hay and vegetables.

The early progress of the cowbird into the East has been chronicled only by scattered milestones, but the creeping advance of the bird is now being followed minutely. It is probably encouraged both by changed land use and the spilling outward of the cowbird's own population explosion. Throughout the last century observers in nearly every part of the Northeast — Ontario, Québec, northern Michigan and western Pennsylvania — have commented on the "recent increase" of the cowbird in their areas.

If Kirtland's Warblers were unprotected

WHAT HAS BEEN the effect of the cowbird in new regions it has entered?

Again the best evidence is available for the Kirtland's Warbler. Between 1961 and 1971 the entire population of this bird declined from about 500 pairs to 200 pairs — a 60 per cent drop. A dangerously low production of young in this period had already been noted, and the cowbird had been identified as the principal culprit. This diagnosis was confirmed in 1972 and thereafter, when control of cowbirds was instituted and the warbler responded by producing more fledglings per pair than ever before reported for a member of this family. When protected from cowbirds, the Kirtland's Warbler has produced more than four young per pair of adults each year. This laid to rest any doubts about the fecundity of the nesting birds.

Walkinshaw's recent studies of protected nests indicate that the previous damage from cowbirds was even greater than we thought. Protected warblers lay more eggs, produce

more second broods, and bring off more young than pairs supposedly unmolested in previous years. We had assumed that a nest without cowbird eggs was untouched, but now we believe the cowbird removes some eggs from nests it does not use subsequently. Also we suspect that warblers rearing cowbirds are less likely to nest a second time in the season, perhaps because of the prolonged burden of feeding more voracious fledglings.

It is rare for men to witness the vanishing of a species at close range. Usually the realization comes only after the event. But here it almost happened. How close it was is shown by a projection from observed former nesting losses and observed present mortality between nesting seasons. These calculations lead to the jolting conclusion that the present population of Kirtland's Warblers would be down to about 20 pairs now (instead of nearly 200) if the production of young had not been quadrupled through protection.

What other birds are prime targets?

WE HAVE NO conclusive evidence of major damage to other songbird species by the cowbird. But there is enough circumstantial evidence to alert us. When populations decline the exact facts are usually unclear and the reasons unknown. Some kind of habitat change can usually be found. In these days pesticides are often suspected. If the cowbird were a prime agent, it would not be proved unless someone were doing an intensive, long-range study of the host at a crucial time. The facts are elusive and they are often obscured by people who remove cowbird eggs from nests they find.

Local damage can be ignored if the losses are made up each year by recruitment from other areas where the same species is highly successful. An example was provided in a study of the Red-eyed Vireo in northern Michigan by William E. Southern. He studied the vireo over a three-year period at the University of Michigan Biological Station on Douglas Lake. Out of 104 nests, 75 (72%) received one or more cowbird eggs. These vireos fledged less than one young per pair per year. This is not enough to sustain the population in the face of any reasonable estimate of mortality for a small migratory bird. Southern concluded the vireo was the prime target of cowbirds there, and said, "The cowbird plays a critical role in the nesting success of the Red-eyed Vireo in the Douglas Lake region." But he was saved from undue alarm because there were plenty of vireos each year nevertheless.

This circumstance is readily explained by the undisturbed production of vireos elsewhere. Less than 300 miles away at almost the same latitude but in northern Ontario, Louise de Kiriline Lawrence had just completed a study of the Red-eyed Vireo and found no cowbird eggs at all in the nests. Her region is not unbroken wilderness, but the approaches south of it are more heavily forested than Michigan, and the cowbird, although present, was still scarce. From areas like this we would expect surpluses that could replenish localities where the bird is suffering real damage.

How much pressure from the cowbird can a small host stand? Obviously this will vary by species, and any answer at present would be speculative. The most vulnerable presumably would be those already stressed by marginal habitat and barely holding on. Here a small increase in mortality at the nest could tip the scales. Populations of small birds that normally bring off only one brood a year are likely to be delicately poised, and these might include particularly some of the warblers, vireos, and flycatchers in our own neighborhoods. For some of these I would become uneasy if the rate of parasitism were above 30 per cent.

Yet I would not want to offer any one magic figure. For each situation there is probably a unique threshold, above which the status of the population deteriorates rapidly. At 50 per cent of nests parasitized, I believed the Kirtland's Warbler was close to the brink. But at a similar rate, the Ovenbird in southern Michigan was not in danger in the opinion of Harry W. Hann, who studied that bird. Yet these, the Kirtland's and the Ovenbird, are among the largest of the warblers, and we would expect smaller members of the family to suffer more damage at the same rates of parasitism.

Indeed, something is happening to many small birds around us. In my area of northwestern Ohio the Yellow-throated Warbler nested fairly commonly along the larger streams among the sycamores and cottonwoods (remember the Sycamore Warbler?) until about 1900. I have always been intrigued by the disappearance of this warbler, because of all the forest types in this area, the least disturbed has been that of the flood plains and stream banks, where the sycamore and cottonwood still grow to their greatest size. Also I have read with interest that the Cerulean Warbler was the most abundant member of this family next to the Yellow Warbler before the turn of the century. And I remember groups of Cerulean Warblers in areas of the county parks 25 years ago from which they have vanished today. Why? The glib answer is "lack of habitat," but one would be hard put to describe major changes in wilderness parks. Perhaps a general reduction in woodland elsewhere must be considered. But I am also suggesting the cowbird

be considered. It was on the scene of the crime — and increasing steadily in the same period.

IN NORTHWESTERN OHIO, Louis W. Campbell has kept meticulous records of birds in the area for more than 50 years. He has taken a particular interest in the birds of the Oak Openings Park, a tract of more than 4000 acres, where there has been no cutting, draining, or burning, although inevitable changes have occurred through the maturing of the forest and the encroachment of trees into open spaces. He has recorded consistent and severe declines in a number of species that nested here regularly in some numbers forty or fifty years ago. These include the Yellow-throated and Warbling Vireos and the following warblers: Black-and-white, Golden-winged, Cerulean, Common Yellowthroat, Yellow-breasted Chat, and American Redstart. In speculating about declines in this varied group, he wondered if the local changes were a part of a continental deterioration in conditions resulting from pesticides, herbicides, and a myriad of human disturbances.

I point out that an agency capable of damaging such birds was present and increasing in the same period of time.

Other birds that might be vulnerable are the small flycatchers, particularly the Traill's and Acadian. Walkinshaw's studies in Michigan showed that the entire clutches of these species are wiped out by the presence of one cowbird egg. In his sample the parasitism rate for the Acadian was 24 per cent and the loss rate about the same. This is damage the bird may be able to survive, but losses much higher than this would be alarming.

It may be that I take too gloomy a view of the cowbird effects — except in the case of the Kirtland's Warbler where the proof is conclusive. It may be that other species have defenses that we do not yet appreciate or there are limitations on cowbird density that prevent it from exceeding critical numbers almost everywhere. But lacking such assurance, I cannot escape the conclusion that the cowbird in some places can become a menace to some small nesting songbirds.

Kirtland's Warbler. Photo by Michael Bolton.